

TROPHIC FEATURES OF THE LITTLE OWL (*ATHENE NOCTUA*) (SCOPOLI, 1769) IN AN ARID AREA OF ALGERIA- THE CASE OF EL MESRANE (DJELFA) IN 2006

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ABSTRACT

Among owls sometimes several species coexist exloitant similar clothes sometimes the same hunting sites, study from their balls of rejection can then enter their food specialization structure and changes populations de their prey and at the same time complement the local fauna list.

We studied the food mode off Cheveche d' Athena (*Athene noctua*) in the area off El Mesrane (Djelfa), located in high lime pits off Algeria. The analysis off 101 pellets off rejecion enabled custom to recognize 64 species-preys. In many preys, the Insects (relative abundance, AR = 70 %) proven consumed themselves. Within Insecta ingested it there's 73 *Messor sp* (A.R. % = 17.4 %), 22 *Leucosomus sp* (A.R. % = 5.3 %), 16 *Rhizotrogus sp* (A.R. % = 3.8 %) et 16 *Pimelia sp* (A.R. % = 3.8 %), followed by the micromammifères (AR = 19.34%), the birds like afterwards with (AR= 7.17%). Feeding on these kind of preys, this raptor is regarded as auxiliary of the farmer.

KEYWORDS: *Athene noctua*, Djelfa, Diet, Auxiliary of the Farmer

INTRODUCTION

Cheveche d' Athena is the species which suffers more of the modifications made to rural environments in which she saw Chaline *et al.* (1974). Many authors were interested in the food mode of this night raptor within its surface of distribution. Thus, among most recent work, one can quote those of Sekour *et al.* (2011) with Djanet (Algeria), of Marniche *et al.* (2001) in Tunisia, Bon *et al.* (2001) in Italy, Hounsome *et al.* (2004) in the United Kingdom, Obuch & Kristin (2004) in Egypt, Syria and Iran, Alivizatos *et al.* (2005) in Greece or of Zhao *et al.*(2007) in China. This work aims at emphasizing the importance of the ravageurs of the cultures in the food mode of the Owl of Athena.

Raptors are predators that occupy the top da chain alimentaire. Compte Given the type of prey sélectionnées par these as harmful to crops mammals, they are considered useful auxiliary farmer (Amat & Soriguer, 1981;Baziz *et al.*, 2005). On Ramade after (1984), they contribute to the imitation of the size of prey populations even if the levy may seem low. Several studies have been made in order to clarify the diet of some species of raptors in the world as Delibes *et al.* (1984) in Spain, Roulin (1996) in Switzerland, Natalini *et al.* (1997) in Italy, Rifai *et al.* (2000) in Jordani Rihane (2005) in Morocco. Algeria in the work performed are those of Baziz *et al.* (2005), Sekour *et al.* (2010). Leprésent work aims to highlight the importance of pests dultures in the diet of the owl of Athena according to the study period

MATERIALS AND METHODS

The town of Djelfa is located at 300 km in the south of Algiers ($34^{\circ} 41' \text{NR}$; $3^{\circ} 15' \text{E}$.). The area of Djelfa is located on the high plains of Algeria with an average altitude of 860 Mr. ($34^{\circ} 11'$ with $34^{\circ} 54' \text{NR}$, $3^{\circ} 15'$ with $3^{\circ} 46' \text{E}$.). It is limited to north by Sebh Rous, in the South by the septentrional side of the Saharian Atlas, in the east by Zahrez Chergui and Ouest by Zahrez Gherbi (Figure 1).

The collection of the balls of rejection of *Athene noctua* is carried out in the station of El Mestrane on the level of an electric pole during the months February and October 2006. Each ball is put aside in a small paper cone on which the date and the designation of the place of collection are mentioned. After measurements, the contents of the balls are studied.



Figure 1: Geographical Location of the Area of Djelfa

The method of analysis used is that of the alcoholic wet process. The ethanol used contains 5 to water 10%. The use of alcohol to make macerate the balls containing of the insects in great proportion makes the handling of the fragments very easy. This operation facilitates the hulling which is made using two pairs of fine grips to separate and sort the food remainders in various categories. Identification of the species - preys invertebrates was ensured thanks to the use of dichotomic keys and collection of insectarium of the Agronomic National institute of El Harrach. Concerning the vertebrate ones, keys of determination used those of Cuisin (1989) for the birds, of (Grassé and Dekeyser, 1955), of Osborne and Helmy (1980), of Orsini *et al.* (1982) and of Barreau *et al.* (1991) for the rodents. Invertebrate's enumeration is done by counting of mandibles number, heads, thorax, wing-sheaths and cerques.

Most dominated item in number is that which represents prey specie taken in consideration. One individual corresponds with presence of 6 femurs, 6 tibias, 1 head, 1 thorax, 2 wing-sheaths, 2 mandibles, or 2 cerques one on the right, the other on the left. Systematically, each piece found is measured in the aim to valuate size of the prey and its biomass. Vertebrate's enumeration is based in the first place on presence of fore-crane and jaws or mandibles. When those last ones are absent, long bones are taken as reference. In mammals it is taken in account of number of femurs, of peroneotibus, of humerus, of cubitus and of radius for counting of birds, it is taken in account Femurs, tibias, tarsometatarses, humerus, cubitus, radius and metacarpus. Frontal, humerus and femur are reference bones for recognition of reptiles. As for enumeration, a frontal bone corresponds to one individual. On the other hand, it is essential to have 2 semi-jaws (upper or lower), 2 femurs, 2 radius or 2 cubitus to can count one individual.

The results obtained are exploited using the following indices of diversity:

- The total richness (S) which is the full number of the species found in all the balls of the raptor Blondel (1975);
- The average richness (Sm) which is the median number of the species found in each ball Ramade (1984);
- The relative abundance (AR %) which is the report/ratio of the number of the individuals of a species-prey (nor) to the full number of the individuals, all species confused (NR) Zaime & Gautier (1989);
- The index of diversity of Shannon-Weaver (H'), considered as one of the best means of expressing the diversity of a Blondel assembly, Blondel *et al.* (1973) and which is obtained by the formula: $H' = - \sum IQ \log_2 IQ$ where H' is an indication of diversity expressed out of bits and IQ the relative frequency of species I catch in consideration;
- The index of equitability (E) which is the report/ratio of the diversity observed (H') with maximum diversity (H'_{\max}) Blondel (1979). Maximum diversity is given by the formula: $H'_{\max} = \log_2 S$ where S is the total richness Weesie & Belemsobgo (1997). The equitability varies between 0 and 1.

RESULTS

Dimensions of the Balls

In a total way, the balls of Cheveche are longer than broad. They measure on average 26.5 ± 6.76 mm for the lengths and 12.9 ± 3.73 mm for the large diameters.

Specific Richness of the Preys

The analysis of the contents of these balls enabled us to identify 64 species-preys. The specific average richness is of 4.15 ± 2.54 (Nor = 419).

The food mode of the Owl chevêche is very diversified. It as well includes/understands the invertebrates represented by the arthropods as the vertebrate ones corresponding to the reptiles, the birds and the micromammifères. Figure 2 represents the food spectrum of *Athene noctua* in the area of Djelfa.

At the chevêche of Athena, the consumption of the insects was shown very strong (A.R. 70 %), followed by that of Rodentia (A.R. 19.34%), then by that of Aves (A.R. 7.17%), the Reptile come afterwards with (A.R. 1.43%).

Relative Abundance of the Species Preys of *Athene noctua*

The numerical importance and the abundance of each species-prey compared to the whole of the preys introduced and listed in the balls of *Athene noctua* are indicated in table 1.

Index of Diversity of Shanon-Weaver

The diversity of Shanon-Weaver recorded for the various species preys of *Athene noctua* is of ($H' = 4.93$ bits), maximum diversity is of ($H'_{\max} = 6$ bits). The value of the equal distribution obtained of the species preys is ($E = 0.82$).

DISCUSSIONS

The balls of rejection of *Athene noctua* have a greater variability their lengths than their large diameters. In a total way, they measure on average 26.5 ± 6.76 mm for the lengths and 12.9 ± 3.73 mm for the large diameters. Indeed, (Sekour *et al.*, 2006) mention dimensions of the balls of Cheveche d' Athena found with Me Sila equal to 35.2 ± 7.9 mm

for the lengths and to 12.1 ± 2.4 mm for the large diameters. This study made it possible to count a total of 65 species-preys including (Nor = 419). (Obuch & Kristin, 2004) having worked they also on the food mode of Cheveche d'Athena in arid regions announce 125 species-preys (Neither = 1315) in Egypt, 133 species (Neither = 2700) in Syria and 135 species (Neither = 1924) in Iran while in the natural reserve of Mergueb (Omri *et al.*, 2006) only 38 species-preys announce (Nor = 202). These differences are certainly influenced by the characteristics of the prospected mediums but also by those climatic of the season to which the study is carried out like and perhaps especially by the effort of sampling.

The more one increases the number of more peeled balls one meets individuals and more one increases the chance to meet new species, chance which decreases however with the effort of sampling up to the point of saturation which is according to the diversity of the mediums. The share of the arthropods and in particular of the insects in the food of the cheveche is of 72%. This entomophagous mode was already announced in other areas but with however of the variations in the proportion of the insects (Delibes *et al.*, 1984; Denys *et al.*, 2004). Thus, in the north and the center of Algeria (Nadji & Doumandji, 2003; Baziz *et al.*, 2005) or in other areas except the Maghreb (E. G. Good *et al.*, 2001; Obuch & Kristin, 2004; Alivizatos *et al.*, 2005) the insects are more slightly consumed (Marniche *et al.*, 2001) make comparable observations in Tunisia since they write that 88,5% of the preys of the Owl cheveche are insects.

The micromammifères occupy the second place after the insects with a rate 19.34%. In Sicily (Italy) Lo Verde & Massa (1988) mention relatively important percentage is 16.4%. The especially made up rate of micromammifères by rodents introduced by the Owl chevêche highest is observed in Romania by Laiu & Murariu (1997) correspondent with 94.8%. This strong percentage is explained by exceptional conditions which prevailed this year. Indeed *Athene noctua* was found vis-a-vis an intense pullulation of Rodentia. In third position one finds the birds with 7.17%. It is to be noticed that in the régurgitas Owl cheveche collected close to the Lake Ichkeul in Tunisia Marniche *et al.* (2001) do not mention any bird. On the other hand in this same country in the saline ones of Thyna Kayser (1995) the presence of avian species mentions corresponding to an important rate equal to 40%. This author explains that the proportion of this category of preys is so high because of the shortage of the insects available in this site, which obliged *Athene noctua* with rebattre on the birds. The reptiles come afterwards with a rate 1.43%. In Sicily Lo Verde & Massa (1988) underline a value 3.3%.

On the other hand Almelhim *et al.* (1997) listed a very high rate of 35.5% of reptiles. The index of diversity of Shannon-Weaver is regarded as an ecological parameter able to translate the diversity of the Blondel settlements *et al.* (1973) $H' = 4.93$. Concerning the preys of the Owl chevêche Genot & Bersuder (1995) in Alsace Lorraine make state of a value H' equal to 1.6 bits. In an adjoining country in Spain Delibes *et al.* (1984) mention an index of diversity of Shannon also rising Weaver with 1.6 bits. In addition, the value obtained within the framework of this study agrees with that of Guerzou *et al.* (2008) with Djelfa ($H' = 5.4$) and of Benjaballah *et al.* (2005) with Draâ Souari ($H' = 4.49$ bits). The index of equitability $E = 0.82$. Of this fact the raptor behaves rather in predator general practitioner. It is to be recalled that Benjaballah *et al.* (2005) announce that the Owl chevêche behaves like a predator general practitioner in Draâ Souari ($E = 0.77$) and like predator specialist at Oued Smar ($E = 0.28$).

CONCLUSIONS

The study of the food mode of *Athene noctua* in the area of Djelfa enabled us to count 5 classes, 64 species-preys. If one looks at the numbers of captured preys (AR = 70 % for the insects), one can say like many of other authors, that this owl is primarily insectivorous. Among vertebrate the preys, the micro mammalian come in second position with (AR= 19.34%), then piece of Aves (AR = 7.17%). The other categories of preys are more slightly consumed. In conclusion

the research results carried out on the balls of the Owl cheveche constitute a serious support for the protection of this species. Its role in the combat against the vermin and vectors of diseases is well-known by the specialists, but insufficiently included/understood by the agricultural experts. Sometimes she is persecuted like “bringer of ill-luck”, by ignoramuses. *Athene noctua* renders to the man a great service by removing it from the ravageurs of the cultures without spending of money on the one hand, and without using products of fight which pollute surround it on the other hand.

REFERENCES

1. Alivizatos H, Goutner V, Zogaris S. 2005. Contribution to the study of the diet of four owl species (Aves, Strigiformes) from mainland and island areas of Greece. *Belg. J. Zool* 135: 109-118.
2. Al melhim WN, Amr ZS, Disi AM, Katbeh-bader A. 1997. On the diet of the Little Owl *Athenenoctua* in the Safawi area, eastern Jordan. *Zool. middle east* 15: 19-28.
3. Barreau D, Rocher A, Aulagnier S. 1991. *Eléments d'identification des crânes des rongeurs du Maroc*. Société Française pour l'Étude et la Protection des Mammifères, Puceul. 17 P.
4. Baziz B, Sekour M, Doumandji S, Denys C, Metref S, Bendjaballah S, Nadji FZ. 2005. Données sur le régime alimentaire de la Chouette chevêche (*Athenenoctua*) en Algérie. *Aves*, 42 : 149-155.
5. Bendjaballah S, Baziz B et Doumandji S. 2005. Note sur le régime alimentaire des deux sous espèces de la Chouette chevêche *Athene noctua glaux* et *Athene noctua saharae* en milieu agricole dans deux étages bioclimatiques différents. *Ornithologia algirica*, (1): 6 – 15.
6. Blondel J. 1975. L'analyse des peuplements d'oiseaux – éléments d'un diagnostic écologique. La méthode des échantillonnages fréquentiels progressifs (E.F.P). *Rev. Ecol. (Terre et Vie)*, 29 : 533-589.
7. Blondel J. 1979. Biogéographie de l'avifaune algérienne et dynamique des communautés. *Sem. intern. avif.algérienne*, 5 – 11 juin 1979, *Inst. nati. agro, El Harrach* : 1-15.
8. Blondel J, Ferry C, Frochot B. 1973. Avifaune et végétation, essai d'analyse de la diversité. *Alauda*, 10: 63-84.
9. Bon M, Ratti E, Sartor A. 2001. Seasonal variations in the diet of the little owl *Athene noctua* (Scopoli, 1769) in a tilled site on the edge of Venice Lagoon. *Bollettino del Museo Civico di Storia Naturale di Venezia*, 52: 193-212.
10. Chaline J, Baudvin H, Jammot D, Saint Girons M-C. 1974. *Les proies des rapaces, petits mammifères et leur environnement*. Ed. Doin, Paris.
11. Cuisin J. 1989. *L'identification des crânes des passereaux (Passeriformes – Aves)*. Diplôme d'études supérieures et de recherche, Université de Bourgogne, Dijon.
12. Delibes M, Brunet-Lecomte P, Manez M. 1984. Datos sobre la alimentación de la Lechuzacomún (*Tyto alba*), el Buhochico (*Asio otus*) y el Mochuelo (*Athene noctua*) en unamismalocalidad de Castilla la Vieja. *Ardeola*, 30: 57-63.
13. Denys C, Canet C, Cuisin J, Pharisat A. 2004. Diversité des petits mammifères et prédatation : l'importance des études néotaphonomiques pour la reconstruction paléoécologique des sites plio-pléistocènes, le cas d'Etrabonne (Jura, France). *Miscelánea en homenaje a Emiliano Aguirre, Paleontología*, XX : 159-178.

14. Genot J.C, Bersuder D. 1995. Le régime alimentaire de la Chouette chevêche, *Athene noctua*, en Alsace-Lorraine. *Ciconia*, 19 (1) : 35 – 51.
15. Grasse PP, Dekeyser PL 1955. Ordre des Rongeurs. Pp 1321-1573 in : P.P.Grassé (ed.), *Traité de Zoologie, Mammifères*. Tome XVII, fascicule 2. Ed. Masson et Cie Paris, T. XVII, fasc. 2, pp. 1172 – 2300.
16. Guerzou A, Derdoukh W, Doumandji S. 2008. Relations trophiques antre les trois prédateurs *Atelerix algirus*, *Tytoalba* et *Corvus corax* dans la région de Guelt-es-Stel (Djelfa). 3^{ème}*Jour. Nati. Protec. Végét.*, 7 et 8 avril, *Dépar. Zool. agro. Fro., inst. nati. agro., El Harrach*, p. 42.
17. Kayser Y. 1995. Régime alimentaire inhabituel de la Chouette chevêche (*Athene noctua*) dans les Salins de Thyna, Tunisie. *Alauda*, 63, (2) : 152 – 153.
18. Laiu L, Murariu D. 1997. Nourriture de la Chouette chevêche (*Athene noctua* Scop., 1759) (Aves : Strigiformes) pendant l'été, dans une dépression sous-carpatique de Moldavie-Roumanie. *Trav. Mus. Nati. Hist. Natu. « Grigore Antipa »*, Vol. 37 : 319 -326.
19. Libois R.M., 1977. Contribution à l'étude du régime alimentaire de la Chouette chevêche (*Athenenoctua*) en Belgique. *Aves*, 14 (3): 165 – 177.
20. Lo verde G, Massa B. 1988. Abitudinalimentari delle civetta (*Athene noctua*) in Sicilia. *Naturalistasicil.*, S. IV, XII (suppl.) : 145 – 149.
21. Marniche F, Baziz B et Doumandji S. 2001. Note sur le régime alimentaire de la Chouette chevêche *Athene noctua* (Scopoli, 1769) près du lac Ichkeul (Tunisie). *Ornith. alger.* I : 14-21.
22. Nadji FZ, Doumandji S. 2003. Part des insectes dans le régime alimentaire de la Chouette chevêche *Athene noctua* (Scopoli, 1769) (Aves, *Strigidae*) dans un milieu saharien à Adrar. *7ème Journée d'Ornithologie*, 10mars 2003, *Dép. zool. agri. for., Inst. nati. agro., El Harrach*, p. 31.
23. Natalini R, Manganaro A, Tomassi R, Ranazzi L, Pucci L, Demartini L, De Giacomo U, Tinelli A, Piattella E, Fanfani A. 1997. Spettro trofico del Barbagiani *Tyto alba* (Scopoli, 1759) e della Civetta *Athene noctua* (Scopoli, 1769) nellatenuta di Castelporziano (Roma). *Alula*, IV (1 – 2): 20 -28.
24. Obuch J, Kristin A. 2004. Prey composition of the little owl *Athene noctua* in an arid zone (Egypt, Syria, Iran). *Folia Zool.*, 53: 65-79.
25. Omri O, Sekour M, Baziz B, Souttou K, Doumandji S. 2006. Place des insectes dans le régime alimentaire de la Chouette chevêche *Athene noctua* (Scopoli, 1969) à Mergueb (M'Sila, Algérie). *Colloque International : L'Ornithologie à l'Aube du 3ème Millénaire*, 11, 12 et 13 Novembre 2006, *Dép. Scie. Bio., Univ. El-Hadj Lakhdar, Batna*, p. 44.
26. Orsini P, Cassaing J, Duplantier JM, Cruest H. 1982. Données sur l'écologie des populations naturelles de souris, *Mus spretus* et *Mus musculus domesticus* dans le midi de la France. *Rev. Ecol. (Terre et Vie)*, 36: 321-336.
27. Osborne D.J, Helmy I. 1980. The contemporary land mammals of Egypt (including Sinai). *Fieldiana (Zool.)*, 5 : 1-579.
28. Ramade F. 1984. *Eléments d'écologie – Écologie fondamentale*. Ed. McGraw – Hill, Paris.

29. Rifai L, Al – Mehim W.N, Garaibeh B, Amr Z. S. 2000. The diet of the Desert Eagle Owl, *Bubo ascalaphus*, in the Eastern Desert of Jordani. *Journal of Arid Environments*, 44 (3): 369 – 372.
30. Rihane A. 2005. Contribution à l'étude du régime alimentaire de la Chouette effraie *Tyto alba* dans les plaines semi-arides du Maroc (compléments). *Go South Bull.* 2 : 37 – 43.
31. Roulin A. 1996. Alimentation hivernale de la Chouette effraie (*Tyto alba*), du Hibou moyen duc (*Asio otus*), du Busard Saint – Martin (*Circus cyaneus*) et du Faucon crécerelle (*Falco tinnunculus*). *Bull. Soc. Natu.*, 84(1) : 19 – 32.
32. Sekour M, Baziz B, Soutou K, Doumandji S, Guezoul O. 2006. Régime alimentaire de trois rapaces nocturnes dans la réserve naturelle de Mergueb : Comparaison entre pelotes de réjection et restes au nid. *Colloque International : L'Ornithologie à l'Aube du 3ème Millénaire*, 11, 12 et 13 Novembre 2006, Dép. Scie.Bio., Univ. El-Hadj Lakhdar, Batna, p. 17.
33. Sekour M, Soutou K, Denys C, Doumandji S, Ababsa L, Guezoul O. 2010. Place des ravageurs des cultures dans le régime alimentaire des rapaces nocturnes dans la région Steppique à Ain El – Hajel. *Lebanese Science Journal*, (1) : 3 – 12.
34. Sekour M, Beddias R, Soutou K, Denys C, Doumandji S, Guezoul O. 2011. Variation saisonnière du régime alimentaire de la Chouette chevêche (*Athene noctua*) (Scopoli, 1769) dans l'extrême Sud-Est du Sahara algérien (Djanet, Algérie) *Rev. Écol. (Terre et Vie)*, 66 :79 – 91.
35. Weesie D.M, Belemsobg O.U. 1997. Les rapaces diurnes du ranch de gibier de Nazinga (Burkina Faso) – Liste commentée, analyse du peuplement et cadre biogéographique. *Alauda*, 65 : 263-278.
36. Zaime A, Gautier J-Y. 1989. Comparaison des régimes alimentaires de trois espèces sympatriques de Gerbillidae en milieu saharien au Maroc. *Rev. Ecol. (Terre et vie)*, 44: 263-278.
37. Zhao W, Song S, Shao M, Liu F. 2007. Seasonal variation in diets of little owl *Athene noctua* in Minqin Desert Experimental Station, Gansu. *Acta Zoologica Sinica*, 53:953-958.

APPENDICES

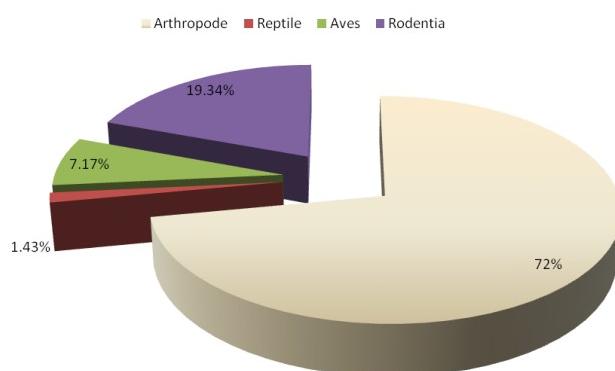


Figure 2: Food Spectrum of the Owl Cheveche in Djelfa in 2006

Table 1: Abundance of the Species Preys

Espèces	Pi (g)	Ni	A.R.%	B %	C%
Aranea	0.1	6	1.43	0.01	5.94
Sollifuge	3	1	0.24	0.03	0.99
<i>Galeodes</i> (scorpion)	3.31	2	0.48	0.08	1.98
<i>Arachnida</i>			2.15	0.12	
Odonatoptera sp	0.3	2	0.48	0.01	1.98
Mantidae	0.7	3	0.72	0.02	2.97
Ensifera	0.1	4	0.95	0.00	2.97
<i>Odonturasp</i>	0.5	1	0.24	0.01	0.99
Grylidae	0.2	5	1.19	0.01	4.95
<i>Gryllus bimaculatus</i>	0.8	6	1.43	0.05	3.96
<i>Gryllotalpa</i> sp	3	2	0.48	0.07	1.98
<i>Brachytrupes megacephalus</i>	3	8	1.91	0.27	7.92
Caeliferasp.	1	1	0.24	0.01	0.99
<i>Acrididae</i> sp.	1.57	7	1.67	0.13	5.94
<i>Sphingonotus</i> sp.	1	2	0.48	0.02	1.98
Lygeadaesp.	0.25	3	0.72	0.01	2.97
<i>Forficula auricularia</i>	0.2	2	0.48	0.00	0.99
Coleoptera sp.	0.2	4	0.95	0.01	3.96
<i>Botenoderes</i> sp.	0.5	3	0.72	0.02	2.97
<i>Rhizotrogus</i> sp.	0.7	16	3.82	0.13	13.86
<i>Pimelia</i> sp.	1.57	16	3.82	0.29	13.86
<i>Erodius</i> sp.	1.5	5	1.19	0.09	3.96
<i>Sepidium</i> sp.	0.3	3	0.72	0.01	2.97
Curculionidae sp.	0.1	9	2.15	0.01	8.91
<i>Leucosomus</i> sp.	0.11	22	5.25	0.03	16.83
Buprestidae	0.52	2	0.48	0.01	1.98
<i>Pachychila</i> sp.	0.3	2	0.48	0.01	0.99
Tenebrionidae	0.6	9	2.15	0.06	8.91
<i>Forficula auricularia</i>	0.2	2	0.48	0.00	0.99
Carabeidae	0.3	4	0.95	0.01	3.96
Dermestidae	0.14	3	0.72	0.00	2.97
Nematocera	0.1	2	0.48	0.00	1.98
Cetinodae	0.13	1	0.24	0.00	0.99
<i>Adimonia</i> sp.	0.3	2	0.48	0.01	1.98
<i>Ocypus olens</i>	0.2	2	0.48	0.00	1.98
Cerambicydae	0.25	1	0.24	0.00	0.99
Scarabeidae	0.6	2	0.48	0.01	1.98
Anticidae	0.07	2	0.48	0.00	1.98
Elateridae	0.08	4	0.95	0.00	2.97
Oxythera sp.	0.5	2	0.48	0.01	1.98
<i>Chlaenius</i> sp (coleo)	0.7	3	0.72	0.02	2.97
<i>Lixus</i> sp.	0.5	1	0.24	0.01	0.99
<i>Pseudoclyonus hirographicus</i> (curculionidae)	0.22	7	1.67	0.02	4.95
Lepidoptera sp.	0.5	8	1.91	0.05	7.92
Noctuidae	0.5	2	0.48	0.01	1.98
Hymenoptera	0.008	1	0.24	0.00	0.99
Bethylidae sp.	0.3	2	0.48	0.01	0.99
Formicidae	0.05	5	1.19	0.00	4.95
<i>Messor</i> sp	0.08	73	17.42	0.07	34.96
<i>Messor</i> sp ₁	0.08	4	0.95	0.00	3.96
<i>Messor</i> sp ₂	0.08	14	3.34	0.01	4.95
<i>Crematogaster scutellaris</i>	0.008	2	0.48	0.00	1.98
<i>Cataglyphis</i> sp	0.008	4	0.95	0.00	3.96

Table 1: Contd.,

<i>Cataglyphis bicolor</i>	0.008	3	0.72	0.00	2.97
Insecta			69.93	1.55	
Ophidien sp	10	2	0.48	0.23	1.98
Lacertidae sp	30	3	0.72	1.03	2.97
Agamidae sp	35	1	0.24	0.40	0.99
Reptelia			1.43	1.65	
Aves sp	20	10	2.39	2.28	9.9
<i>Passer</i> sp	26.3	2	0.48	0.60	1.98
Passeriformes	25	9	2.15	2.57	8.9
Columbidae	125	2	0.48	2.85	1.98
<i>Sturnus vulgaris</i>	72	7	1.67	5.75	6.93
Aves			7.16	14.04	
<i>Gerbilinae</i> sp	25.6	25	5.97	7.30	24.75
<i>Meriones shawii</i>	120	55	13.13	75.26	54.45
<i>Crocidura</i>	7	1	0.24	0.08	0.99
<i>Mammalia</i>			19.33	82.64	
Totaux		419	100.00		

